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DETAILED DESCRIPTION

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[Detailed description]

[0001]

[The technical field to which invention belongs] this invention relates to the washing station used in order to carry out the washing elimination of the residue for example, after soldering.

[0002]

[Prior art] Although the washing technique using chlorofluorocarbon as general technique for carrying out the washing elimination of the residue after soldering is learned, it is in the inclination that use of chlorofluorocarbon is restricted for environmental preservation, and non-chlorofluorocarbon washing technique is desired in recent years.

[0003] On the other hand, the alkaline water or acid water obtained by electrolyzing water is excellent in washing capacity, and is used for washing in various fields from the former. A degreasing operation and the solvent action of alkaline water of the acid are strong, and its capacity to remove the organic substance is also high. Moreover, acid water has an effect in elimination of inorganic substances, such as an oxide and a hydroxide, and having a germicidal action and an astringent operation further is known. As for the alkaline water or acid water for these washing, it is desirable to carry out electrolysis generation within a washing station, and it has the grade which does not need to fill up an acid or an alkali medical fluid and which does not need a replenisher tank, and the advantage which can simplify equipment.

[0004] The technique of washing a contact lens using the acid water which contains electrolytic alkali water and a hypochlorous acid for example, in a Provisional-Publication-No. 254416 [ 63 to ] official report and a Provisional-Publication-No. 254417 [ 63 to ] official report as the washing technique using such electrolytic alkali water or electrolysis acid water is indicated. Moreover, the technique which leads the chlorine gas which occurred with another cell in the publication-number 218454 [ one to ] official report to electrolytic alkali water, and carries out washing disinfection is indicated.

[0005]

[Object of the Invention] However, by the above-mentioned technique, there was a trouble of becoming dirty in a penetrant remover and a component condensing, and a detergency declining gradually, or an electrode having become dirty and deteriorating of a component, while in use. In order to cancel this, it reverse-electrolyzes after a fixed duration of service, and the technique (Provisional-Publication-No. 147693 [ 59 to ] official report) of preparing an overflow path in a technique [ of washing an electrode ] (Provisional-Publication-No. 254416 [ 63 to ] official report), technique [ of applying an ultrasonic wave and washing an electrode side ] (Provisional-Publication-No. 189551 [ 58 to ] official report), and electrolysis acid water side, switching a circuit suitably, pouring electrolysis acid water to an electrolytic alkali water side, and washing an electrode etc. is proposed

[0006] However, a channel system becomes complicated by requiring these processings, or since washing of an electrode is inadequate, it is hard to maintain stably high washing capacity over a long period of time. Moreover, drainage will be issued out of a system at the degree of electrode washing, and we are anxious about the influence which it has on an environmental side.

[0007] The problem of this drainage is generated also in the electrolytic alkali water manufacture machine using the water which let the water purifier of for example, an active-carbon formula pass, a channel is switched timely for regeneration of active carbon, the organic substance which has an acidic group in this case although what is reproduced through the electrolysis acid water generated simultaneously to active carbon is known (publication-number 57282 [ five to ] official report) secedes from active carbon, and the drainage containing this occurs in large quantities. Moreover, although the technique of supplying electrolysis ozone gas with a cleaning agent is indicated by the publication-number 305927 [ four to ] official report, since this cleaning method is one step of washing, it is necessarily enough [ a cleaning method / neither an acid nor an alkali component ] to wash the washing object which adhered firmly. Furthermore, although it is carrying out recovery use, using drainage as a condensation steam, when consuming great energy at the time of this re heating, a detergency needs to decline, or the polluted recovery steam has a possibility of polluting a washed object, and it is necessary to update it timely.

[0008] While a deer is carried out, this invention can become dirty in a penetrant remover, a component cannot condense it and a high detergency can be demonstrated over a long period of time, chlorofluorocarbon is not used, but issue out of the system of a dirt component is suppressed, and it aims at offering the washing station and the washing technique which do not pollute an environment.

[0009]

[The means for solving a technical problem] The electrolysis water generation machine 3 which the washing station of this

invention electrolyzes the aqueous solution of water or an electrolyte as shown in drawing 1, and generates acid water or the alkaline water. The electrolysis backwashing-by-water tub 1 which washes a washed object using the obtained electrolysis acid water or electrolytic alkali water, the pure-water generation machine 4 which generates a pure water from the above-mentioned electrolysis acid water or electrolytic alkali water, and the pure-water washing tub 2 which washes a washed object using the obtained pure water are provided (claim 1).

[0010] In the above-mentioned configuration, the electrolysis acid water or electrolytic alkali water generated with the electrolysis water generation vessel 3 is used for preceding paragraph washing as a wash water in the electrolysis backwashing-by-water tub 1. The electrolysis water which consists of electrolysis acid water or electrolytic alkali water is excellent in a detergency, acid water is used for elimination of an inorganic compound, and the alkaline water is mainly used for elimination of the acid or an organic compound. A pure water is reproduced with the pure-water generation vessel 4, and the electrolysis water which is not used is used as a finishing wash water in the pure-water washing tub 2.

[0011] Thus, dirt is effectively removable by electrolysis water excellent in the detergency performing preceding paragraph washing, and performing finishing washing by the pure water further. Moreover, since a pure water is reproduced, and the electrolysis water which is not used is finished and is used for washing, it can lose washing drainage. Since the dirt component in a wash water is removed by being decomposed by oxidation or reduction on the electrode of the electrolysis water generation machine 3, or making it stick to active carbon etc. with the pure-water generation vessel 4, a dirt component does not condense it and it can demonstrate a detergency high for a long period of time.

[0012] In addition to the above-mentioned configuration, you may establish a means chosen as the above-mentioned electrolysis backwashing-by-water tub 1 or the pure-water washing tub 2 out of ozone and hydrogen peroxide solution to supply a kind at least (claim 2). The hydrogen-peroxide generator 7 which specifically uses as a raw material the oxygen gas or hydrogen gas generated with the above-mentioned electrolysis water generation vessel 3, and compounds a hydrogen peroxide is formed (refer to drawing 2), and the obtained hydrogen peroxide is supplied to the above-mentioned electrolysis backwashing-by-water tub 1 or the pure-water washing tub 2 (claim 3). Or what is necessary is to form the ozone generator 8 which uses as a raw material the pure water generated with the above-mentioned pure-water generation vessel 4, and compounds ozone (to refer to drawing 4), and just to supply the obtained ozone to the above-mentioned electrolysis backwashing-by-water tub 1 or the pure-water washing tub 2 (claim 4).

[0013] Ozone or a hydrogen peroxide has a high oxidation capacity, and since it carries out the decomposition elimination of the organic substance, if these are added to a wash water, its detergency will improve further. Especially, the hydrogen-peroxide generator 7 or the ozone generator 8 is formed, if it compounds electrochemically using hydrogen, oxygen, etc. which carry out the byproduction of these with the electrolysis water generation vessel 3, it is not necessary to supply ozone or a hydrogen peroxide from the exterior, and the deployment of the by-product can be carried out.

[0014] The above-mentioned electrolysis water generation machine 3 has the anode electrode 32 and the cathode electrode 33 which specifically carry out opposite \*\*\*\* on both sides of the diaphragm 31 which bisects the inside of a container, and this diaphragm 31, and or more [ hydrogen gas melted by the above-mentioned cathode electrode 33 side by electrolyzing the electrolytic aqueous solution ] nine [ pH ], it generates electrolysis acid water for less than 12 electrolytic alkali water by the anode electrode 32 side (claim 5).

[0015] Or more [ the hydrogen gas generated with the above-mentioned electrolysis water generation vessel 3 melted ] nine [ pH ], less than 12 electrolytic alkali water is effective as a wash water for carrying out the washing elimination of the residue after soldering. Hydrogen is melted in 0.000139g (40 degrees C)-0.000079g (80 degrees C), and electrolysis water at the time of the total pressure 1 normal atmosphere of a gaseous phase. The hydrogen gas melted in electrolysis water returns the oxide of the tin in a pewter front face between a pewter and a flux residue (elimination of a white residue), and the flux residue stuck to the pewter front face is floated. The wash water which has pH 9 or more and less than 12 moderate alkalinity acts on this flux residue, and flux is micell-ized and is removed.

[0016] Since the anode electrode 32 is just impressed to the cathode electrode 33, the anion in an electrolyte carries out the electrophoresis of it to the anode electrode 32 side. The organic-acid ion which is the component of flux of the anion gathering in about 32 anode electrode oxidizes by the anode electrode 32, and finally it is decomposed into a carbon dioxide and water, and it is removed. Moreover, the Broensted-acid ion like halogen ion, and a carbonate ion and acetic-acid ion changes about 32 anode electrode electrolysis water acid.

[0017] Since the cathode electrode 33 is impressed to negative to the anode electrode 32, the cation in an electrolyte carries out the electrophoresis of it to the cathode electrode 33 side. As a cation which carries out a migration in the cathode electrode 33 orientation, there is alkali-metal ion in an electrolyte etc. and these change about 33 cathode electrode electrolysis water alkaline. In the cathode electrode 33, while water electrolyzes and a hydroxide ion generates, hydrogen gas is generated.

[0018] The noble metals in which a hydrogen overvoltage is small and tends to generate hydrogen by electrolysis as the above-mentioned cathode electrode 33 material of the above-mentioned electrolysis water generation machine 3, nickel, or a stainless alloy is used suitably (claim 6). As the above-mentioned electrolyte, a carbonate, a hydrogencarbonate, a percarbonate (claim 7), or a hydroxide is mentioned (claim 8), and a detergency is raised. It is desirable to perform electrolysis in the above-mentioned electrolysis water generation machine 3 at 40-80 degrees C at which it is tended to absorb hydrogen electrolysis water (claim 9).

[0019] After less than 12 electrolytic alkali water washes the washed field or more [ the hydrogen gas generated with the above-mentioned electrolysis water generation vessel 3 melted ] nine [ pH ], you may be made to carry out saturation processing

of this with the electrolysis acid water generated by the anode electrode 32 side of the above-mentioned electrolysis water generation machine 3 (claim 10). Although pH may increase and the alkaline wash water which remained in the front face of the washed field may become the cause of the pewter cauterization by drying, it can prevent this by adopting and carrying out saturation washing of the above-mentioned washing technique.

[0020]

[Gestalt of implementation of invention] Hereafter, this invention is explained based on a drawing. Drawing 1 is the schematic diagram showing the configuration of the washing station of this invention, and is equipped with two washing tubs, the electrolysis backwashing-by-water tub 1 which performs preceding paragraph washing using electrolysis acid water or electrolytic alkali water, and the pure-water washing tub 2 which performs finishing washing of a washed object using a pure water.

[0021] It is the electrolysis acid water or electrolytic alkali water generated with the electrolysis water generation vessel 3, while (here electrolytic alkali water (cathode water)) the above-mentioned electrolysis backwashing-by-water tub 1 is supplied as a wash water. Another [ which is not used ] electrolysis water is sent to the pure-water generation machine 4, and is reproduced by the pure water here. With the pure water supplied from the pure-water makeup tank 6, usually, after heating the reproduced pure water with a heater 5, it is sent to the pure-water washing tub 2, and is used for finishing washing. The used wash water is sent to the electrolysis water generation machine 3 with the wash water of the electrolysis backwashing-by-water tub 1, and repeats the above-mentioned washing cycle.

[0022] Next, the detail of above-mentioned each part of a washing station is explained. The electrolysis water generation machine 3 is equipment which counters, allots the anode electrode 32 and the cathode electrode 33 on both sides of a diaphragm 31, impresses a direct current between two electrodes, and disassembles water. That is, it is hydrogen-ion  $H^+$  at the same time oxygen occurs, as the anode electrode 32 shows to a formula (1). It generates, and pH of liquid falls and becomes acid.

$H_2O \rightarrow 1/2O_2 + 2H^+ + 2e^- \dots (1)$

The electrolysis acid water (anode water) obtained is effective in elimination of inorganic substances, such as an oxide and a hydroxide, and has a germicidal action and an astringent operation. On the other hand, it is hydroxide-ion  $OH^-$  at the same time hydrogen occurs like a formula (2) in the cathode electrode 33. - It generates, and pH of liquid rises and becomes alkaline.

$2H_2O + 2e^- \rightarrow H_2 + 2OH^- \dots (2)$

The electrolytic alkali water (cathode water) obtained has a degreasing operation and the solvent action of the acid, and its elimination capacity of the organic substance is also high.

[0023] In order to make the electrode reaction of the above (1) and (2) perform, it is required for the grade whose electrolysis is possible for liquid resistance to be small, and, as for the big water of liquid resistance, it is good to electrolyze by making distance of the cathode electrode 33 and the anode electrode 32 as small as possible, or adding the ionicity matter, and raising the conductivity of water. When washing the matter which generally contains the ionicity matter in large quantities, it has the conductivity of the grade which is only the ion component contained in the washed water, and can also electrolyze by remaining as it is. When electrolysis is difficult, you may carry out optimum-dose addition of the ionicity matter, such as a sodium chloride (NaCl) and a sodium sulfate ( $Na_2SO_4$ ). When especially NaCl is added, chlorine gas occurs by the formula (3) by the anode electrode 32, and it becomes a hypochlorous acid (HClO) and melts into the electrolytic solution.

$2Cl^- \rightarrow Cl_2 + 2e^- \dots (3)$

Since it has disinfection and a bleaching operation and a detergency is excellent, the electrolytic solution containing HClO can be more effectively washed, if this electrolysis acid water is used.

[0024] Conductive oxides, such as the noble metals with corrosion resistance, such as platinum, gold, and iridium, and a ferrite, a ruthenium oxide, or graphite can be used for the material which constitutes the anode electrode 32. Various materials, such as stainless steel, others, for example, nickel, and titanium, can be used for the cathode electrode 33 that what is necessary is just to excel in corrosion resistance under alkaline. [ material / which constitutes the above-mentioned anode electrode 32 ]

[0025] Although especially the quality of the material of a diaphragm 31 is not limited, since warm water may be used, the thing excellent in thermal resistance is good. Moreover, since a cation component is condensed by electrolytic alkali water and can remove an anion component if a cation exchange membrane is used as a diaphragm 31 when using electrolytic alkali water for washing, it is effective to remove especially the anion component of a washed object. Conversely, what is necessary is just to use an anion exchange layer to condense only an anion component.

[0026] In addition, the anode electrode 32 has the effect which there is an operation which carries out electrolytic oxidation of the organic substance dirt contained in [ other than the operation which generates acid water ] a wash water, and is finally decomposed into carbon dioxide gas and water, and prolongs the active-carbon life in the pure-water regenerator 4 mentioned later. Moreover, when ozone or a hydrogen peroxide is added by pure-water finishing washing, these are decomposed into oxygen and water and it has the effect which prolongs the life of the ion exchange resin in the pure-water regenerator 4.

[0027] Thus, electrolytic alkali water (cathode water) is sent to the above-mentioned electrolysis backwashing-by-water tub 1 among the electrolysis acid water obtained and electrolytic alkali water, and electrolysis acid water (anode water) is sent to the pure-water generation machine 4.

[0028] With the pure-water generation vessel 4, the electrolysis acid water generated with the electrolysis water generation vessel 3 is reproduced to a pure water. Although it is based on any, such as heating distillation and a reverse osmosis membrane formula, in order not to issue drainage, as for the pure-water generation machine 4, what can adsorb effectively the organic substance and the inorganic substance which are discharged in a washing process, and can remove them is desirable. Generally, first, the organic

substance is removed through active carbon, and an anion and a cation component are made to stick to ion exchange resin, and, next, let them be a pure water. Drainage cannot be taken out with using this reproduced pure water for finishing washing of the pure-water washing tub 2, but it can wash efficiently by it.

[0029] Thus, the obtained pure water is sent to the pure-water washing tub 2, and is used for finishing washing of a washed object. Into the path which sends the reproduced pure water to the pure-water washing tub 2, it is desirable to install a heater 5 and it can raise a detergency by using warm water. A heater 5 can use various things, such as an electric heater and a steam heat exchanger. Since a wash water warm-water-izes by the Joule's heat under electrolysis in the electrolysis water generation machine 3 in this invention, there may be little energy of a heater 5. Moreover, in order to fill up the pure water which evaporates by heating, it is good to form the pure-water makeup tank 6 and to supply a pure water suitably.

[0030] Washing in the pure-water washing tub 2 and the electrolysis backwashing-by-water tub 1 mentioned above is made by being immersed in the washing tubs 1 and 2, or atomizing the wash water in the washing tub 1 and 2 to the shape of a spray and a shower at a washed object, and contacting a washed object. As for the detergency of a wash water, it is the most effective to carry out the spray of the wash water to a washed object from nozzles 11 and 21 using a pump depending on temperature besides own chemical property of a wash water, a pressure, and the status and grade (grade of a stirring speed, a turbulent flow, and a laminar flow) of flowing, since especially an operation of temperature and a pressure is large. When carrying out a soak cleaning, it is desirable to carry out the bubbling of the washing tub by the ozone inclusion oxygen gas generated with air or the ozone generator mentioned later, or to attach a ultrasonic vibrator in a washing tub, and to make a wash water permeate enough.

[0031] Thus, since it is washing by making washing effectively and moreover finishing by washing two phases using the reproduced pure water, drainage can be lost. Moreover, it becomes dirty in the generation process of electrolysis water and a pure water, the decomposition elimination of the component can be carried out, and a fall of a detergency can be prevented.

[0032] In addition, in order to carry out the washing elimination of the residue after soldering, it is good to use the electrolytic alkali water in which the hydrogen gas which is adjusted to 9 or more and less than 12, and is generated by the cathode electrode 33 melted pH as a wash water in the electrolysis backwashing-by-water tub 1. The solubility of the acidic component of a flux residue has small pH at less than nine, and a detergency declines. Moreover, there is a possibility of corroding tin. There is a possibility that pH may corrode the tin which is an amphoteric metal in 12 or more than it.

[0033] An electrolytic condition can adjust pH of the electrolytic alkali water generated by the cathode electrode 33. That is, the cation concentration, the current density, and electrolysis time in the aqueous solution which it is going to electrolyze can adjust pH of the cathode electrolytic solution to any value. for example,  $[Na^+]$  ion concentration becomes  $[1.]$  in ten - five mols  $[1.]$  /, or ten - two mols /- as --  $NaCO_3$  etc. -- if an electrolyte is added and electrolyzed into water -- now and  $pH = -\log[H^+] = 14 + \log [OH^-]$

Finally the liquid by the side of a cathode electrode can be made into alkali to pH 9-12 from there being \*\*\*\*\* and there being a relation of  $[Na^+] = [OH^-]$  in order to maintain electrical neutrality. In other words, it can consider as the liquid containing NaOH (ten - five mols  $[1.]$  /, or ten - two mols/l.).

[0034] It can be early reached in time so that the current density at the time of electrolysis is large to this pH. Moreover, it is better to add an electrolyte so that it may become cation addition of a more a little from it, since in fact mixes while the acidic component of flux washes and pH does not become alkali to a predicted value for fire. Although it is possible to control to sufficiently fixed pH with an early cation addition for a long time when the amounts of mixing of the acidic component of flux are few, when there are many amounts of mixing of an acidic component, pH sensor may be attached in a washing tub, and an electrolytic condition (current density, time) may be controlled by this signal, or the cation from an auxiliary tank may be added so that it may be set to fixed pH.

[0035] The electrolyte added at the time of electrolysis can use not only the above-mentioned thing but a lithium, sodium, a potassium, the carbonate of caesium, a hydrogencarbonate, or a percarbonate. When excelled in a detergency, even if these remain, they do not do a bad influence. The hydrogencarbonate of the field of solubility, pH, and a cost to sodium is suitable. Moreover, the hydroxide of a lithium, sodium, a potassium, and caesium can also be used as an electrolyte, and the outstanding detergency is shown. From the field of solubility and pH, the hydroxide of sodium is used suitably.

[0036] At this time, it is good to use noble metals, such as the platinum and palladium which are easy to generate hydrogen, and iridium, nickel, those alloys, or a stainless alloy as a material which constitutes the above-mentioned cathode electrode 33. Especially, the nickel from a cost and the point of corrosion-resistant, nickel-plating iron, or the stainless alloy is suitable. As a stainless alloy, the ferrite and martensite system stainless steel which do not contain nickel are sufficient, and you may be the austenite stainless steel containing the good nickel of corrosion-resistant.

[0037] Moreover, if electrolysis in the above-mentioned electrolysis water generation machine 3 is performed at 40-80 degrees C, it will be tended to absorb hydrogen electrolysis water. If the temperature which electrolyzes is less than 40 degrees, the viscosity of electrolysis water will go up and the reaction rate of electrolysis will also fall. Moreover, a detergency also declines. If temperature exceeds 80 degrees, the solubility of hydrogen will fall and the reducing power of electrolysis water will decline.

[0038] After washing the washed field using less than 12 or more pH 9 electrolytic alkali water which this hydrogen gas melted, you may be made to carry out saturation processing with the electrolysis acid water further generated by the anode electrode 32 side of the above-mentioned electrolysis water generation machine 3. This neutralizes the alkaline wash water which remained in the front face of the washed field, and the cauterization of a pewter can be prevented.

[0039] Although the electrolysis backwashing-by-water tub was set to one and only electrolytic alkali water was used as a wash water in the above-mentioned example, two or more electrolysis backwashing-by-water tubs can be prepared, electrolysis acid

water may be supplied at one side, electrolytic alkali water may be supplied to another side, and the dirt of the washed object which becomes dirty and has both acidity and the alkaline matter as a component can be removed effectively.

[0040] Moreover, if a kind of a hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) or the ozone (O<sub>3</sub>) or both are added to the above-mentioned pure-water washing tub 2, finishing washing capacity can be raised further. These matter has a high oxidation capacity and it excels in the capacity which carries out the decomposition elimination of the organic substance H<sub>2</sub>O<sub>2</sub>. As hydrogen peroxide solution, it supplies with the type of a medical fluid supplement, and is O<sub>3</sub>. Since a system can be simplified if these matter is electrochemically compounded in the above-mentioned washing system although xerensis oxygen gas may be compounded through an ozone electric discharge system, it is more desirable. The example of the washing station which built the hydrogen-peroxide generator or the ozone generator into below is shown.

[0041] Drawing 2 has \*\*\*\*ed the hydrogen-peroxide generator 7 in the middle of the passage which is the gestalt of enforcement of the 2nd of this invention, and results in the pure-water washing tub 2 from a heater 5. In the washing tubs 1 and 2, it has made as [ wash / immersing ]. Other configurations are the same as that of the 1st above-mentioned example.

[0042] The detail of the hydrogen-peroxide generator 7 is shown in drawing 3. This equipment 7 divides the inside of the fuel cell type cell 71 to two or more rooms by ion exchange membrane 72, it has the configuration which joined the anode electrode and the cathode electrode to the both sides, and ion exchange membrane 72 is using the solid electrolyte layer (perfluoro sulfonic-acid polymer) here. The inside of a cell 71 makes the anode room 73 and cathode electrode side the cathode room 74 for the anode electrode side, and H<sub>2</sub> (refer to formula (2)) generated by the cathode electrode 33 of the electrolysis water generation machine 3 is introduced into the anode room 73 from the introductory way 75. On the other hand, the pure water which O<sub>2</sub> (refer to formula (1)) generated by the anode electrode 32 of the electrolysis water generation machine 3 generates with the pure-water generation vessel 4 from the introductory way 76 is introduced into the cathode room 74 from the introductory way 77. And O<sub>2</sub> introduced H<sub>2</sub> It is made to react electrochemically and is H<sub>2</sub>O<sub>2</sub>. It compounds.

[0043] That is, in the anode electrode 32, hydrogen gas ionizes by the formula (4), and it is  $H_2 \rightarrow 2H^+ + 2e^-$  ... (4)

At the cathode electrode 33, it is H<sub>2</sub>O<sub>2</sub> by the formula (5). It generates. In addition, the reaction of a formula (6) other than a formula (5) advances by the cathode electrode 33.

$2H^+ + O_2 + 2e^- \rightarrow H_2O_2$  ... (5)

$(4H^+ + O_2 + 4e^- \rightarrow 2H_2O)$  ... (6)

Here, it is H<sub>2</sub>O<sub>2</sub> of the above-mentioned formula (5). In order to give priority to a generation reaction over the reaction of a formula (6) and to make it perform, it is good for the catalytic activity of the reaction of a formula (5) to use noble metals, such as high gold, for the cathode electrode 33. The quality of the material of the anode electrode 32 has desirable noble metals, such as platinum which ionization of hydrogen is quickly performed and is excellent in corrosion resistance, and iridium.

[0044] Thus, H<sub>2</sub>O<sub>2</sub> generated by the cathode electrode 33 The water to contain is timely or always led to the pure-water scrubber 2 from the derivation way 78. An acidic component and an organic component are removed by electrolytic alkali washing by the washing tub 1 (degreasing), and can carry out the decomposition elimination of the remains organic substance by finishing washing by the hydrogen-peroxide addition pure water further. Therefore, concentration of the dirt component of the pure-water washing tub 2 can be prevented. Moreover, H<sub>2</sub> which carries out a byproduction with the electrolysis water generation vessel 3 O<sub>2</sub> H<sub>2</sub>O<sub>2</sub> It can use effectively as a synthetic powder.

[0045] The gestalt of enforcement of the 3rd of this invention is shown in drawing 4. In this example, in addition to the electrolysis backwashing-by-water tub 1 which uses electrolytic alkali water, the electrolysis backwashing-by-water tub 9 is formed, the electrolysis acid water (anode water) generated with the electrolysis water generation vessel 3 is supplied, and it has made as [ perform / three-stage washing of electrolytic alkali water, electrolysis acid water, and a pure water ]. Moreover, the ozone generator 8 is \*\*\*\*ed in the middle of the passage which results in the pure-water washing tub 2 from a heater 5. Washing in each washing tubs 1, 2, and 9 is made as [ carry out / spray washing / using a pump ]. Other configurations are the same as that of the 1st above-mentioned example.

[0046] The detail of the ozone generator 8 is shown in drawing 5. In drawing, the inside of the ozone generator 8 is divided by two or more rooms by the ion exchange membrane 81 which consists of a solid electrolyte layer (perfluoro sulfonic-acid polymer). The anode electrode and the cathode electrode are joined to the both sides of ion exchange membrane 81, and the anode room 82 and cathode electrode side is made into the cathode room 83 for the anode electrode side. It is good to use the high material of an oxygen occurrence overvoltage, for example, a lead dioxide, for an anode electrode. It is desirable to use noble metals, such as platinum, for a cathode electrode. The introductory ways 84 and 85 of the pure water generated with the pure-water generation vessel 4 are \*\*\*\*ed by the anode room 82 and the cathode room 83, respectively, and ozone is compounded in the anode electrode 32, using a pure water as a raw material by the formula (7). In addition, in the cathode electrode 33, hydrogen gas is generated by the above-mentioned formula (2).

$3H_2O \rightarrow O_3 + 6H^+ + 6e^-$  ... (7)

Here, by the anode electrode 32, in order that an oxygen occurrence reaction may also occur simultaneously according to the above-mentioned formula (1), after all, by the anode electrode 32, the mixed gas containing oxygen and ozone will generate and the ozone inclusion pure water derived from the derivation way 86 is supplied to the pure-water scrubber 2. An acidic component is the electrolysis backwashing-by-water tub 1, and an alkali component is removed by the electrolysis backwashing-by-water tub 9, and can remove further the dirt which remains with an ozone inclusion pure water. Moreover, the decomposition elimination of the organic substance dirt can be carried out by carrying out the bubbling of the ozone inclusion oxygen gas to the electrolysis backwashing-by-water tub 1, concentration of a dirt component can be prevented, and the active-carbon life in the pure-water

generation machine 4 can be improved.

[0047] What is necessary is for there to be not necessarily no need of supplying the pure water supplied to the above-mentioned ozonator 8 to the anode room 82 and a cathode room 83 car room, and just to supply it to the cathode room 83 at least. Moreover, the amount of the water to supply should just have the amount in which an electrode front face gets wet enough. It is accepted cathode room 83, it passes, and in supplying, only the water which penetrated ion exchange membrane 81 from the cathode room 83, and reached to the anode room 82 reacts, and it generates ozone inclusion oxygen gas. Therefore, there is no fear of a fall of the current efficiency by impurity mixing into an anolyte, and it is not necessary to perform the ion exchange treatment (impurity elimination) of an anolyte.

[0048] In addition, by introducing oxygen gas to the cathode room 83, by the cathode electrode 33, the hydrogen-peroxide occurrence reaction of a formula (5) can also be performed in addition to the hydrogen occurrence reaction of the above-mentioned formula (2), and an H<sub>2</sub>O<sub>2</sub> inclusion pure water can be obtained in [ room / cathode / 83 ] this case with the above-mentioned ozonator 8. Since this reaction advances so advantageous that the pressure of oxygen gas is large, as for the cathode room 83, it is desirable to carry out in the state of the pressurization of the 1 or more normal atmosphere.

[0049] Drawing 6 is the ozone and H<sub>2</sub>O<sub>2</sub> which are the gestalt of enforcement of the 4th of this invention, carry out in this way and are generated. It has made as [ wash / using an inclusion pure water ]. In this example, the ozone generator 8 is \*\*\*\*ed in the middle of the passage which results in the pure-water washing tub 2 from the pure-water generation machine 4, a pure water is introduced by the above-mentioned pure-water generation machine 4, and oxygen is introduced from the anode room of the electrolysis water generation machine 3 at the cathode room 83 of the ozone generator 8. And H<sub>2</sub>O<sub>2</sub> generated at the cathode room 83 While an inclusion pure water is supplied to the pure-water washing tub 2, the bubbling of the ozone inclusion oxygen gas which occurs at the anode room 82 is carried out to the washing tub 1 by electrolytic alkali water, and the pure-water washing tub 2, and a soak cleaning is performed. An acidic component and an organic component are removed by the electrolysis backwashing-by-water tub 1, and the decomposition elimination especially of the organic component is carried out for ozone. With the pure water which furthermore contains the ozone and the hydrogen peroxide of the pure-water washing tub 2, the decomposition elimination of the remains organic substance can be carried out. Therefore, concentration of the dirt component of a washing tub is prevented and a high detergency can be maintained for a long period of time.

[0050] Moreover, carrying out the electrolysis synthesis of the ozone with the above 3rd and the ozone generator 8 shown in the gestalt of the 4th enforcement has the following advantages to the ozone generator using electric discharge.

- 1) It is not necessary to use a dry air or xeransis oxygen as a raw material, and the dryer is unnecessary.
- 2) Don't need the electric discharge circuit of the high voltage.
- 3) Don't generate detrimental NO<sub>x</sub> generated by the electric discharge in air.
- 4) When compounding ozone water, even if the dissolution rate of the ozone gas to water is slow and carries out the bubbling of the ozone gas to water, it is difficult to generate high-concentration ozone water for a short time. Since the status of an ozone saturation is maintained on the electrode front face when compounding ozone by the electrolytic decomposition process according to this example, high concentration ozone water can compound comparatively for a short time.

[0051] In addition, it decomposes, and ozone and the hydrogen peroxide which are added by the wash water in each above-mentioned example tend to volatilize, remain for a product, and do not have a bad influence.

[0052]

[Example]

(Example 1) Next, in order to check the effect of this invention, the washing examination was performed using the washing station shown in above-mentioned drawing 1. What added 0.1ml of the water-soluble flux for soldering to JISII type sinking comb type electrode (what carried out pewter plating at Cu wiring pattern on a glass epoxy-group plate), and carried out remelting processing (for 220 degrees C and 5 minutes) as washed field was used.

[0053] The wash water used as base liquid (pH4) what melted flux to the pure water by the concentration of 1g/l. supposing mixing of a flux component. As an electrolysis water generation machine 3, it is 2 the electrode area of 200cm<sup>2</sup> in a 3l. container. Two platinum plating titanium plates (platinum plating thickness:2micrometer) are used as electrodes 32 and 33. What was installed with the distance between electrodes of 5mm is used, and it is NaHCO<sub>3</sub>. : Prepare the electrolyte aqueous solution which added 1. in base liquid in 0.01 mols /, and it introduces into the electrolysis water generation machine 3. When electrolyzed, it is 2 10mA/cm. By the electrolysis acid water [ of the maximum pH3 ], and cathode electrode 33 side, the hydrogen saturation electrolytic alkali water of the maximum pH11 was obtained at the anode electrode 32 side at an electrolysis with constant current and the time of voltage 20V (the amount of 0.0001g/l. of hydrogen lysis).

[0054] After having made into the wash water the hydrogen saturation electrolytic alkali water of pH 10.8 obtained as mentioned above and washing the above-mentioned washed field by the electrolysis backwashing-by-water tub 1 (for 60 degrees C and 1 minute), hot air drying of the pure-water rinse was performed and carried out by the pure-water washing tub 2. evaluation of the degree of washing -- the Ando Electric Co., Ltd. make -- insulating resistance-measurement equipment VGM-BB -- using -- 94% of relative humidity, and 40-degree C constant temperature -- the surface insulation resistance 1 minute after 100V impression was measured in the constant humidity chamber The evaluation technique was considered as the following three-stage evaluation, and showed the result in Table 1.

O. surface insulation resistance >103 Mohm\*\* : 10M-omega<= surface insulation resistance <=103 Mohm; surface insulation resistance <10M-omega[0055] In Table 1, the washing technique, the elimination grade of a white residue judged by viewing and SEM (scanning electron microscope) observation, and the etching grade of the pewter section were written together. The

evaluation technique is as follows, respectively.

elimination grade O: of a white residue -- perfect -- elimination \*\*: some elimination x: -- almost --

etching-grade-O: -etching-less \*\*: of the remains solder section -- small -- etching x: etching size [0056]

[Table 1]

	洗 淨 法	一 段 め 洗 淨 液 PH	表 面 絶 縁 抵 抗	白 色 残 渣 除 去 程 度	は ん だ 部 エ ッ チ ン グ
実施例 1	H <sub>2</sub> 飽和アルカリ電解水+純水すすぎ	10.8	○	○	○
2	H <sub>2</sub> 飽和アルカリ電解水+酸性電解水+純水すすぎ	10.8	○	○	○
比較例 1	純水(60℃)洗浄+純水すすぎ	7	△	×	○
2	NaHCO <sub>3</sub> でベース液をPH8.5に調整+純水すすぎ	8.5	○	×	○
3	NaHCO <sub>3</sub> でベース液をPH10.8に調整+純水すすぎ	10.8	○	△	○
4	Na <sub>2</sub> CO <sub>3</sub> でベース液をPH12に調整+純水すすぎ	12	○	△	×

[0057] (Example 2) Next, like the above-mentioned example 1, after the hydrogen saturation electrolytic alkali water of pH 10.8 washed, the acid water (pH 3.4) further generated by the anode electrode 32 side performed the examination which carries out saturation washing. After saturation washing performed the same pure-water washing as the above-mentioned example 1, and xeraxis. A result is written together to Table 1.

[0058] The result with any good [ examples 1 and 2 ] about [ of the solder section ] surface insulation resistance, the elimination grade of a white residue, and etching was obtained so that clearly [ Table 1 ]. In addition, surface insulation resistance was 1:2x10<sup>3</sup> to 6xexample 103 examples 2:4x10<sup>3</sup> to 1x10<sup>4</sup>, was performing saturation washing by acid water, and compared with the case where that is not right, its value of surface insulation resistance was a little large, and it found that washing was more performed to the fitness.

[0059] (Examples 1-4 of a comparison) A thing (example 1 of a comparison) and NaHCO<sub>3</sub> using the pure water as a wash water again Or Na<sub>2</sub>CO<sub>3</sub> The same washing examination was performed using what adjusted pH of base liquid as shown in a table (examples 12-4 of a comparison). A result is written together to Table 1.

[0060] Although all of the degree of washing seen from surface insulation resistance were good except example of comparison 1 which carried out pure-water washing so that clearly [ Table 1 ], the examples 2 and 3 of a comparison have the inadequate elimination grade of a white residue, and the example 4 of a comparison has the inadequate elimination grade of a white residue, and it was greatly etched in the solder section.

[0061] As mentioned above, when saturation washing by acid water is performed after having the effect excellent in pH 9 or more and less than 12 hydrogen inclusion alkali electrolysis water, and washing, it turns out that especially washing of the residue after soldering is more effective.

[0062]

[Effect of the invention] As mentioned above, the washing station of this invention demonstrates the detergency which became dirty in the wash water, and a component did not condense, and was excellent over the long period of time. Moreover, since it is non-chlorofluocarbon washing technique, it can suppress that lose and become dirty and a component discharges washing drainage out of a system and an environment is not polluted, it has the industrially excellent utility value. Moreover, a possibility of giving a damage to the washed field itself since still acid electrolysis water neutralizes after the electrolysis water of a weak alkali field washes, when the outstanding cleaning effect is obtained according to the washing technique of this invention is the parvus.

[Translation done.]



\* NOTICES \*

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1 This document has been translated by computer. So the translation may not reflect the original precisely.

2 \*\*\*\* shows the word which can not be translated.

3 In the drawings, any words are not translated.

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CLAIMS

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[Claim]

[Claim 1] The washing station characterized by to provide the electrolysis water generation machine which electrolyzes the aqueous solution of water or an electrolyte and generates acid water or the alkaline water, the electrolysis backwashing-by-water tub which wash a washed object using the obtained electrolysis acid water or the electrolytic-alkali water, the pure-water generation machine which generate a pure water from the above-mentioned electrolysis acid water or electrolytic-alkali water, and the pure-water washing tub which wash a washed object using the obtained pure water.

[Claim 2] The washing station of the claim 1 publication which established a means chosen as the above-mentioned electrolysis backwashing-by-water tub or a pure-water washing tub out of ozone and a hydrogen peroxide to supply a kind at least.

[Claim 3] The washing station of the claim 1 publication made as [ supply / the obtained hydrogen peroxide / form the hydrogen-peroxide generator which uses as a raw material the oxygen gas or hydrogen gas generated with the above-mentioned electrolysis water generation vessel, and compounds a hydrogen peroxide, and / to the above-mentioned electrolysis backwashing-by-water tub or a pure-water washing tub ].

[Claim 4] The washing station of the claim 1 publication made as [ supply / the obtained ozone / form the ozone generator which uses as a raw material the pure water generated with the above-mentioned pure-water generation vessel, and compounds ozone, and / to the above-mentioned electrolysis backwashing-by-water tub or a pure-water washing tub ].

[Claim 5] The washing station of the claim 1 publication which is what generates electrolysis acid water for less than 12 electrolytic alkali water by the above-mentioned anode electrode side or more [ hydrogen gas melted by the above-mentioned cathode electrode side by having the anode electrode and cathode electrode in which the above-mentioned electrolysis water generation machine carries out opposite \*\*\*\* on both sides of the diaphragm which bisects the inside of a container, and this diaphragm, and electrolyzing the electrolytic aqueous solution ] nine [ pH ].

[Claim 6] The washing station of the claim 5 publication which the above-mentioned cathode electrode becomes from noble metals, nickel, or a stainless alloy.

[Claim 7] The claim 5 whose above-mentioned electrolyte is a carbonate, a hydrogencarbonate, or a percarbonate, or a washing station given in six.

[Claim 8] The claim 5 whose above-mentioned electrolyte is a hydroxide, or a washing station given in six.

[Claim 9] \*\*\*\*\* 5 which performs electrolysis in the above-mentioned electrolysis water generation machine at 40-80 degrees C, or a washing station given in either of 8.

[Claim 10] By carrying out opposite \*\*\*\* of an anode electrode and the cathode electrode on both sides of the diaphragm which bisects the inside of a container, \*\*\*\*ing to two electrodes, and electrolyzing the electrolytic aqueous solution Or more hydrogen gas melted by the cathode electrode side ] nine [ pH ], less than 12 electrolytic alkali water The washing technique characterized by carrying out saturation processing with the above-mentioned electrolysis acid water after less than 12 or more pH 9 electrolytic alkali water which generated electrolysis acid water by the anode electrode side, and the above-mentioned hydrogen gas melted washes the washed field.

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[Translation done.]



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DESCRIPTION OF DRAWINGS

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[An easy explanation of a drawing]

- [ Drawing 1 ] It is the whole washing-station block diagram showing the gestalt of enforcement of the 1st of this invention.
- [ Drawing 2 ] It is the whole washing-station block diagram showing the gestalt of enforcement of the 2nd of this invention.
- [ Drawing 3 ] It is the whole hydrogen-peroxide generator cross section.
- [ Drawing 4 ] It is the whole washing-station block diagram showing the gestalt of enforcement of the 3rd of this invention.
- [ Drawing 5 ] It is the whole ozonator cross section.
- [ Drawing 6 ] It is the whole washing-station block diagram showing the gestalt of enforcement of the 4th of this invention.

[An explanation of a sign]

- 1 Electrolysis Backwashing-by-Water Tub
- 2 Pure-Water Washing Tub
- 3 Electrolysis Water Generation Machine
- 4 Pure-Water Generation Machine
- 5 Heater
- 6 Pure-Water Makeup Tank
- 7 Hydrogen-Peroxide Generator
- 8 Ozonator

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[Translation done.]